

What is claimed is:

1. A method for forming a contact plug in a semiconductor device, comprising the steps of:

5 forming a contact isolation layer on a substrate, the contact isolation layer having an opening exposing a partial portion of the substrate;

depositing a conductive layer within the opening of the contact isolation layer;

10 doping dopants in a manner to allow the conductive layer to have different doping distributions with respect to a thickness; and

forming a contact plug within the opening through a planarization process applied to the conductive layer.

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2. The method as recited in claim 1, wherein the step of doping the dopants further includes:

a first step of doping the dopants until reaching a target deposition thickness by gradually increasing a
20 concentration of the dopants from a first concentration to a second concentration for an interval between an initial conductive layer deposition and the target deposition thickness; and

a second step of doping the dopants in a manner that the
25 second concentration is consistently maintained throughout for an interval from the target deposition thickness to a complete deposition thickness.

3. The method as recited in claim 2, wherein, at the first step, a flow quantity of a doping gas initially added is low and is gradually increased so that the doping concentration of the dopants increases from the first
5 concentration to the second concentration.

4. The method as recited in claim 2, wherein, at the second step, a high flow quantity of a doping gas is added and remained the same throughout so that the doping concentration
10 of the dopants is consistently maintained to be the second concentration.

5. The method as recited in claim 2, wherein the complete deposition thickness after depositing the conductive
15 layer ranges from about 3000 Å to about 3500 Å, and the target deposition thickness ranges from about 500 Å to about 1000 Å.

6. The method as recited in claim 2, wherein the first concentration ranges from about 5×10^{18} dopants/cm³ to about 1
20 $\times 10^{20}$ dopants/cm³, and the second concentration ranges from about 1×10^{20} dopants/cm³ to about 3×10^{20} dopants/cm³.

7. The method as recited in claim 3, wherein the doping gas is PH₃ gas.

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8. The method as recited in claim 1, wherein the conductive layer is either a polysilicon layer or a

polysilicon germanium layer.